EXPANDABLE INTERVERTEBRAL DEVICE, AND SYSTEMS AND METHODS FOR INSERTING SAME

CROSS-REFERENCE TO RELATED APPLICATION

This application claims the benefit of U.S. Provisional Application No. 61/888,387, filed Oct. 8, 2013, which is hereby incorporated by reference in its entirety herein.

FIELD OF THE INVENTION

This invention pertains generally to implantable medical devices and, in particular, to expandable implantable devices for intervertebral fusion and/or immobilization and systems and methods for inserting the same.

BACKGROUND OF THE INVENTION

Many people develop back pain during the course of their life due to traumatic injury, disease, or genetic defect. Typically, the patients' intervertebral discs, which support the spine, are damaged, causing the discs to bulge or herniate. The disc bulge then impinges on the nerves of the spine and causes back pain. Surgeons often perform a discectomy to trim the disc bulge to alleviate back pain. However, the discectomy may structurally weaken the disc and often leads to subsequent structural failure of the disc due to wear and aging, once again causing impingement on the nerves of the spine and back pain. Surgical implantation of a medical implant device to structurally support and separate the vertebrae may become desirable to end debilitating back pain and allow patients to regain normal life activities.

One known device for promoting fusion between adjacent vertebrae is an expandable interbody device (IBD). Such devices are generally configured to be inserted into the intervertebral space in a compact configuration, and then are expanded to an expanded configuration to restore the adjacent vertebrae to a desired spacing and provide stability at the affected joint. Numerous mechanisms are known for expanding the lateral size of an expandable IBD. It is also known to provide an IBD with one or more openings in the top and bottom surfaces of the IBD for containing bone graft material to promote fusion between the vertebrae to stabilize the joint.

One disadvantage of known laterally expandable IBDs is that the lateral size may be too large for insertion into the intervertebral disc space from a variety of surgical approaches, limiting the versatility of the IBD. For example, some known expandable IBDs include opposing body portions that are connected via a pivot or rotary hinge at one end and are configured for insertion with the body portions side-by-side. Such a side-by-side configuration is less advantageous or too large for some surgical approaches that have an especially narrow insertion opening.

Another perceived shortfall of known laterally expandable IBDs is maintaining the IBD in the desired expanded position. Some known laterally expandable IBDs lack structure to keep the device from expanding further or retracting after being expanded initially by a surgeon. Because the intervertebral joint is subject to movement, it is desirable for the expandable IBD to be restricted from shifting from the desired expanded configuration after being positioned in the intervertebral space.

A further disadvantage of known expandable IBDs is that it is difficult or impossible to insert bone graft material into or adjacent the expandable IBD after the IBD has been inserted into the intervertebral space. While some expandable IBDs may be configured to hold bone graft material for promoting fusion, once the device is expanded, in some cases there may not be sufficient bone graft material to fill the bone graft cavity in the device such that sufficient bone graft material is kept in contact with the adjacent vertebral endplate to adequately promote bone ingrowth.

SUMMARY OF THE INVENTION

In accordance with one aspect of the invention, an expandable intervertebral device for implantation within an intervertebral space between adjacent vertebrae is provided. The implant device includes first and second bearing or spacer members that are expandable for shifting the members between a compact unexpanded configuration and an expanded configuration. The spacer members are operably connected to one another via connecting portions of the first and second bearing members to allow for shifting of the spacer members with respect to each other. The unexpanded configuration minimizes the lateral width of the intervertebral device to provide ease of insertion of the device into the intervertebral space. The expanded configuration increases the lateral width of the intervertebral device to increase the stability of the joint and further promote fusion of the adjacent vertebrae by increasing the area in which osteoconductive material may be positioned. Although the device may be configured to expand laterally in a range of orientations having a range of lateral widths between the unexpanded and fully expanded configurations, it is generally preferable to fully expand the device to maximize its lateral width. In one form, the interbody device is configured such that insertion and expansion of the device may be accomplished with a single tool.

In one form, the spacer members have an elongate configuration each having a longitudinal axis. In the compact, unexpanded configuration, the longitudinal axes are in substantial alignment with each other in order to minimize the lateral width of the implant to promote ease of insertion. In one form of the expanded configuration, the leading end of the second bearing member is shifted away from the trailing end of the first bearing member so as to be spaced in a lateral direction from the trailing end of the first bearing member. In general, the distance that the leading end of the second bearing member can be spaced in a lateral direction from the trailing end of the first bearing member is constrained in part by the size of the intervertebral space between adjacent vertebrae, including all or part of the annulus if the annulus is present. Accordingly, the bearing members are preferably configured to limit how far the bearing members may be expanded to keep the bearing members from protruding from the intervertebral space. The intervertebral device may include a resilient retaining clip for limiting movement of the second spacer member with respect to the first spacer member.

The first and second bearing members are interconnected by connecting portions that are configured to allow the bearing members to shift between the compact and expanded configurations. In one form, the connecting portions include mating projecting and recess portions of the first and second bearing members that are configured to allow the projecting portion to slide in the recess portion as the second bearing member is shifted relative to the first bearing member. In one form, the connecting portions include a guideway of one of the spacer members and a guide member of the other spacer member with the guide member being guided by the guideway as the spacer members are shifted between the compact and expanded configurations. The guideway can be a channel